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An Attempt to Prevent the Establishment of *Mycobacterium johnei* in Calves by Means of Isoniazid Alone and in Combination with Streptomycin

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Introduction

AT the present time there is no way by which Johne's disease can be diagnosed with certainty in the living animal until the characteristic groups of acid-fast bacilli are demonstrable in the faeces. Bacilli are most likely to be found in faeces from animals affected with diarrhoea, and at this time other symptoms may also be apparent. The disease will have been slowly progressing during a period of many months or even years, with the result that the intestinal mucous membrane may well be so severely damaged that it is beyond the regenerative powers of the animal to effect repair.

In previous papers (Larsen & Vardaman, 1953 ; Rankin, 1953) the failure of Isoniazid to cure such cases of clinical Johne's disease in adult cattle has been described. For the reasons given above it is clear that in these cases treatment commenced when the disease was well established. Isoniazid, however, was shown to have the ability to check the growth of *Mycobacterium johnei in vitro*. It was therefore decided to find out if it possessed a similar action *in vivo* by showing that it could prevent the bacillus from establishing itself in calves.

Although Larsen, Vardaman & Groth (1950) and Ford (1952) had failed to cure clinical Johne's disease in cattle using streptomycin a combination of therapeutic agents is often more successful than a single one, and so a proportion of the calves were treated with Isoniazid plus Streptomycin.

Materials and Methods

Animals

Twelve one-month-old Ayrshire calves which had been kept in isolation since birth were used in the experiment. Calves of this age were selected because it had already been shown that they could be readily infected with *M. johnei* (Taylor, 1953).

Infection

All 12 calves were infected by inoculating them intravenously with 100 mg. wet/wt. of a culture of *M. johnei* suspended in 10 ml. Ringer's solution ; the culture having been grown on Taylor/Finlayson solid egg medium (Taylor, 1950) for six weeks. The calves were not kept in separate groups according to treatment, but were run together in a covered yard.

Plan of Experiment

After infection the calves were divided into three groups with four calves in each group. The average weight of the calves in each group was 50 kg.

Group I.—Untreated controls.

Group II.—Treated with Isoniazid. Two calves were dosed from the day of infection and the other two were left for one month before dosing commenced.

Group III.—Treated with Isoniazid plus Streptomycin. Two calves were dosed with Isoniazid plus dihydrostreptomycin sulphate from the day of infection. The remaining two were left for one month before dosing with Isoniazid plus streptomycin sulphate.

Treatment

Isoniazid was given at the rate of 12 mg. per kg. each day for 12 weeks. Dosing was by mouth, the drug being suspended in about 50 ml. water.

Dihydrostreptomycin sulphate was injected intramuscularly at the rate of 1 gramme every 48 hours for 12 weeks.

Streptomycin sulphate was given dissolved in 50 ml. water by mouth at the rate of 1 gramme every 48 hours for 12 weeks.

Cultures

The course of infection was followed during life by cultural examinations of the faeces at monthly intervals using the Taylor/Finlayson medium, five tubes to each sample, and 18 per cent. antiformin substitute (Harring-

ton Bros., Ltd., London) to control contaminants. At *post-mortem* all the major organs and the principal lymph nodes were cultured on the same medium after treatment with 5 per cent. oxalic acid, except in the case of the lungs and bowel where 18 per cent. antiformin substitute was again used.

Histology

From various suspicious areas of the intestine portions were taken *post-mortem* for sectioning. Sections were stained with haemotoxylin and eosin and by the Ziehl-Neelsen method and examined microscopically for changes associated with Johne's disease.

Results

For the first six months after infection faeces samples were cultured at monthly intervals and subsequently less frequently. One calf (No. 6) died of pneumonia two months after infection and treatment, and three others (Nos. 3, 4 and 5) died of Johne's disease between eight months and one year. Fourteen months after the commencement of the experiment the remaining animals were killed. The results of cultural and histological examinations are shown in summary form in Table I. Table II shows the full cultural results.

It can be seen from Table II that the object of the experiment (viz., to prevent *M. johnei* from becoming established in calves after infection) was not attained. In every case the organism was recovered from some, if not all, of the sites cultured.

In one control and three treated animals infection did not extend to the bowel as judged by microscopical examination of sections (Table I). In this connection

TABLE I

SHOWING RESULTS OF OBSERVATIONS MADE ON CALVES INFECTED WITH *M. johnei* AND THEN EITHER TREATED WITH ISONIAZID OR ISONIAZID PLUS STREPTOMYCIN OR LEFT UNTREATED

Group	No. of calf	Treatment commenced	Duration of treatment	Duration in experiment	Cause of death	Monthly faeces cultures 1	2	3	4	5	6	7	8	9	10	11	12	*P.M.* results: Cultures of nodes, etc.	Cultures of bowel	Sections of bowel	Diagnosis: Johne's disease present
I No treatment	1	None	None	14 months	Killed	—	+	+	—	—	—		—	—			—	+	—	—	No
	2	"	"	14 "	"	—	—	+	—	—	—		—	—			—	+	—	+	Yes
	3	"	"	12 "	Johne's disease	—	+	+	+	+	+		+	+				+	+	+	"
	4	"	"	8 "	"	—	+	+	+	—	+							+	+	+	"
II Isoniazid	5	Day of infection	12 weeks	12 months	Johne's disease	—	+	+	—	+	+		+					+	+	+	Yes
	6	" "	12 "	2 "	Pneumonia	—	+											+	+		
	7	One month after infection	12 "	14 "	Killed	—	—	—	—	—	—		—	—			—	+	—	—	No
	8	" "	12 "	14 "	"	—	+	+	+	+	+		+	+			+	+	+	+	Yes
III Isoniazid + Streptomycin	9	Day of infection	12 weeks	14 months	Killed	—	—	—	—	—	—		—	+			—	+	—	—	No
	10	" "	12 "	14 "	"	—	—	—	—	—	—		—	—			—	+	—	—	"
	11	One month after infection	12 "	14 "	"	—	—	—	—	—	—		—	—			—	+	—	+	Yes
	12	" "	12 "	14 "	"	—	+	+	—	+	—		—	+			+	+	+	+	"

TABLE II

SHOWING RESULTS OF CULTURAL EXAMINATIONS OF THE MAJOR ORGANS AND LYMPH NODES FOR THE PRESENCE OF *M. johnei* OF CALVES EITHER TREATED WITH ISONIAZID OR ISONIAZID PLUS STREPTOMYCIN OR LEFT UNTREATED

Group	No. of calf	Time in experiment	Cause of death	Organ: Duodenum	Ileum	Caecum	Liver	Kidney	Spleen	Lung	Bladder
I No treatment	1	14 months	Killed	—	—	—	—	—	—	—	
	2	14 "	"	—	—	—	—	—	—	—	
	3	12 "	Johne's disease	+	+		+	+	+	+	+
	4	8 "	" "	+	+	+				—	—
II Isoniazid	5	12 months	Johne's disease	+	+	C	+	+	+	+	+
	6	2 "	Pneumonia		+	+	+	+	+	+	+
	7	14 "	Killed	—	—	—	—	—	—	—	—
	8	14 "	"	+	+	+	+	+	+	+	
III Isoniazid + Streptomycin	9	14 "	Killed	—	—	—	—	—		—	
	10	14 "	"	—	—	—	—	—	—	—	
	11	14 "	"	—	—	—	+	—	—	+	
	12	14 "	"	C	C	+	+	+	+	+	

Group	No. of calf	Time in experiment	Cause of death	Lymph node: Submaxillary	Retropharyngeal	Prescapular	Popliteal	Hepatic	Iliac	Mediastinal	Ileo-caecal	Mesenteric
I No treatment	1	14 months	Killed	—	+	—	—	+	+	—	+	+
	2	14 "	"	—	+	—	—	+	+	—	+	+
	3	12 "	Johne's disease	+	+	+	+	+	+	C	—	
	4	8 "	"								+	
II Isoniazid	5	12 months	Killed	+	Saprophyte	+	+	+	+	+	+	
	6	2 "	Pneumonia	+	+	+	+		+	+	+	
	7	14 "	Killed	+	+	+	+	—	—	—	+	—
	8	14 "	"	+	+	+	+	+	+	+	+	+
III Isoniazid + Streptomycin	9	14 months	Killed	+	+	+	—	+	—	—	+	+
	10	14 "	"	+	+	—	—	+	+	—	+	+
	11	14 "	"	—	+	+	+	+	—	—	+	+
	12	14 "	"	+	+	+	+	+	+	+	+	+

+ = *M. johnei* recovered. — = *M. johnei* not recovered. C = All tubes contaminated.

it is interesting to note that histological methods revealed 7/11 positive animals whereas cultural examinations of the similar portions of intestine gave only 5/11 as being positive.

Discussion

It will be seen from Table I that, under the conditions of management, the calves were continuously exposed to the risk of re-infection with their own faeces, or those of their neighbours, from the second month after infection until the end of the experiment. This may seem unnecessarily severe, but if prophylaxis along the lines of the experiment was to be of economic value to the farmer the calf would be protected only during the very susceptible first weeks or months of its life, thereafter reliance would have to be placed on the resistance which comes with increasing age.

In view of the results of the cultural examination of the organs and lymph nodes of calf No. 6 (Table II) where *M. johnei* was recovered from 14/14 sites cultured, in spite of the fact that it died after continuous treatment for two months, it is not thought that the *post-mortem* findings in the other animals were due to re-infection from the controls after treatment had stopped. As the calves increase in age this possibility becomes even more unlikely. The severity of the histological lesions was also consistent with a year-old experimental infection.

Regarding the *post-mortem* examinations of the bowel, the superior results given by histological methods when compared with cultural methods are probably due to the adverse effect of antiformin on the survival of *M. johnei*. There is no doubt that the organisms were there as they could be seen in the Ziehl-Neelsen-stained sections and their numbers and appearance suggested that they had been viable. In view of the findings of Gray, Clarke & Johnstone (1954) that the common methods of reducing contamination when culturing *Mycobacterium tuberculosis* kill 80 to 90 per cent. of the tubercle bacilli present, it is quite likely that antiformin, a more powerful agent than those which they examined, will sometimes kill all the *M. johnei* in a sample of faeces or portion of bowel. Unfortunately the milder agents are not capable of holding contamination to within reasonable limits when faeces or bowel are being cultured (Taylor, 1950). It therefore seems likely that at present histological methods may be better than cultural methods for the diagnosis of Johne's disease from a portion of bowel.

Summary

Isoniazid both alone and with streptomycin failed to prevent *M. johnei* from establishing itself in calves after experimental infection.

At *post-mortem* examination of the intestine, histological methods gave more positive results than did cultural methods.

Acknowledgments.—I wish to thank Dr. Gordon, Director of the Agricultural Research Council's Field Station at Compton, for helpful advice and criticism during the course of the work. I should also like to thank Dr. Scott, Imperial Chemical (Pharmaceuticals), Ltd., Manchester, through whom supplies of Isoniazid were made available, and Mr. Mathieson, M.R.C.V.S., Glaxo Laboratories, Ltd., Greenford, for supplies of Streptomycin.

Grass Disease in the Horse

BY

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GRASS disease in the horse has been quite prevalent in this district for many years. Over the course of time we have evolved a method of treatment which, though purely empirical, has been rewarded with success in several cases when the disease has been detected in the very early stages. The following case history is a classic example:—

Subject.

A cross-bred Highland pony mare, 13 years old.

History.

This mare had been out at grass for some weeks. On June 7th, the pony was caught up from grass in the afternoon. It was saddled and bridled and ridden very quietly a distance of four miles. The mare passed dung only once during this ride. She was then tied up in the stable with a handful of hay. At 6.15 p.m. the pony was found pawing the ground with her forefeet and looking around to her sides. No dung had been passed. She had not eaten any hay. Half a glass of whisky in oatmeal gruel was administered by mouth—by the owner—and the pony was put into a loose-box. No further symptoms of colic were exhibited, but the pony looked dull. At 10.45 p.m. the owner rang us and described the symptoms and history. A tentative diagnosis of grass disease was made and it was agreed we should visit the case the following morning.

On June 8th we were informed that at 6.30 a.m. the pony was dull and no dung had been passed through the night. No signs of colic were exhibited.

Treatment.

At 9.30 a.m. the pony was examined. It was in rather gross bodily condition. The general appearance was listless. There was slight sweating on the sides of the neck. The pulse was slightly accelerated—70. Temperature was normal at 100° F. Visible mucous membranes were very slightly congested. Borborygmi was present but less evident than one would expect in an animal from grass. Careful examination disclosed muscular fibrillation in the groups of muscle above the elbow and stifle. These movements were not marked enough to be described as tremors. On examination the rectum was found dilated, empty of faeces, and the mucous membrane felt tacky. At arm's length one found masses of free gelatinous

References

FORD, E. J. H. (1952). *Brit. Vet. J.* **108.** 441.
GRAY, D. F., CLARKE, B. L., & JOHNSTONE, W. E. (1954). *Am. Rev. Tuberc.* **69.** 991.
LARSEN, A. B., & VARDAMAN, T. H. (1953). *J. Am. Vet. Med. Ass.* **122.** 309.
———, ———, & GROTH, A. H. (1950). *Am. J. Vet. Res.* **11.** 374.
RANKIN, J. DEANS. (1953). *Vet. Rec.* **65.** 649.
TAYLOR, A. W. (1950). *J. Path. & Bact.* **62.** 647.
———. (1953). *J. Comp. Path.* **63.** 335.

mucus and a few balls of faeces which were paler in colour and firmer than normal. A firm diagnosis of grass disease was made. Atropine sulphate $\frac{1}{8}$ gr. was administered subcutaneously and the owner was advised to offer the animal nothing but bran mashes and tepid waer. A dose of ʒ ss. Mag. Carb. Pond and ʒ ss. Mag. Sulph. mixed in the bran mash three times daily was prescribed. Instructions were given for this prescription to be given in a drench to the animal if the mash was refused.

At noon, 4 p.m. and 8 p.m. the patient took the bran laxative. At 11 p.m. the animal had three motions all containing obvious mucus.

On June 9th, at 10 a.m. the mare was revisited. She showed great improvement and had twice passed dung during the night. Atropine $\frac{1}{8}$ gr. was administered subcutaneously. Again the animal ate the bran mashes and on June 10th was apparently normal. The laxative was, however, administered until June 13th, when the animal had recovered completely.

Discussion

The writers are well aware that such cases are open to the challenge of incorrect diagnosis, but it should be borne in mind that many years of experience and clinical observation are involved. Furthermore, if this animal had not by chance been stabled at the time it was in the early stages of the illness, the initial symptoms would almost certainly have been missed and a few days later a well-established case of bowel impaction would, in the opinion of the writers, have been encountered.

Acknowledgment.—We are indebted to the owner for the meticulous case history.

"COLOUR FAKING" AT DOG SHOWS

The following extract was printed in the November, 1955 issue of *The Kennel Gazette* and is reproduced by kind permission of the Editor:—

The Committee of the Kennel Club wishes to draw the attention of all exhibitors of pedigree dogs to the following Regulation: 'No dye, colouring, darkening, bleaching or other matter may be used to alter or improve the markings of a dog. Dry white chalk may be used for cleaning, provided that it is removed from the coat before the dog enters the ring. No coloured powder may be applied to the coat of a dog either before or at a show.'

The Committee is satisfied that it has become a practice to colour dogs artificially in certain breeds. An addition has therefore been made to the Regulations for the Preparation of Dogs for Exhibition, by which the Committee now has the power to order the examination of any dog or dogs at Shows without previous notice. Such examination will be carried out by a veterinary surgeon who will be in possession of the written authority of the Committee of the Kennel Club. The veterinary surgeon may if necessary take samples from any dog for further examination and analysis.

If it should be reported that a dog has been exhibited in contravention of the Regulation quoted above, the persons concerned with that dog will be liable to charges of discreditable conduct under Kennel Club Rule 17.

Additions to Regulations

1. The following paragraph after Regulation 3 of the Regulations for the Preparation of Dogs for Exhibition (F):—

'The Committee of the Kennel Club may without previous notice order the examination of any dog or dogs at any show. Any examination thus ordered will be made by a veterinary surgeon who shall have written authority in his possession. The veterinary surgeon may if necessary take samples from any dog for further examination and analysis.'

2. The following to Kennel Club Show Regulation 14 of B (1) and B (2) and Regulation 9 of B (3), which refer to veterinary examinations:—

'Examine any dog or dogs at the Show when requested to do so, in writing, by the Committee of the Kennel Club.'

Breed and Variety Classes

The Kennel Gazette continues:—

In our October issue we published a paragraph under this heading and quoted the following Regulation:—

A dog is not eligible for entry in Variety Classes unless also entered and exhibited in a Breed Class where such a class is provided for which it is eligible. Exemptions from this Regulation are (*a*) a puppy, unless a Class for dogs under 12 months of age for which it is eligible is provided for the breed, (*b*) a dog in Any Variety Field Trial Class, (*c*) a dog in Any Variety Veteran Class.

We should, perhaps, have mentioned that this Regulation applies to Championship and Licence Shows but *not* to Sanction Shows.

This concludes the portion quoted.

Suggested procedure for examination.

Any veterinary surgeon who is officially requested to examine dogs under this new regulation should first rub the suspected hair with cotton wool soaked in surgical spirit, or a 10 per cent. solution of sodium carbonate. If a negative result is obtained a few of the appropriate hairs should be removed and placed in two envelopes which should be sealed and signed. One envelope should be handed to the owner and one to a representative of the Committee of the Kennel Club. The whole examination should take place in the presence of the owner and two witnesses.

EQUESTRIAN OLYMPIC GAMES, 1956

The equestrian events of the Olympic Games will take place at Stockholm next year from June 11th to 17th.

By gracious permission of Her Majesty the Queen the complete team will train in the Royal Mews at Windsor Castle. Horses and riders will commence work at their homes early in the New Year and will come together for collective training at Windsor early in March.

The Application of Aerosols to Atmospheric and Surface Disinfection in the Poultry Industry

I.—The Disinfection of Surfaces and Dust Deposits Using the Microsol Aerosol Generator

BY

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HYGIENE is of particular importance in the poultry industry owing to the large extent to which birds of various ages move from breeding and rearing farms to commercial farms and also to the channelling of eggs from a variety of farms through a relatively small number of hatcheries and the subsequent wide redistribution of chicks. The recent expansion in the use of intensive systems of husbandry for the rearing of growing stock and management of the adults also increases the problem of controlling the transmission of disease. It is, therefore, exceedingly important in hatcheries and poultry houses to institute routine procedures for disinfecting surfaces and atmospheres.

In a number of cases where surfaces are coated with a thick layer of infected organic matter, disinfection is best achieved by a process of soaking and scrubbing with a disinfectant solution. Very often, however, the surfaces to be disinfected are coated with a superficial layer of infected dust only and in such cases disinfection can be achieved by the use of a disinfectant solution in spray form. Surface disinfection by droplet dispersions of disinfectant solutions has advantages both from the point of view of speed of application and also for the ease with which inaccessible surfaces can be disinfected.

The behaviour of solutions in the droplet form depends to a great extent on the size of the droplets produced. If these are larger than 150 microns diameter wet mists are usually formed. Such mists do not persist for long as the droplets rapidly fall out of suspension or burst on contact with surfaces. The dispersal of mists of this type is therefore very limited when the sprayer is operated from a fixed point. If the droplets produced are of aerosol size (5 to 120 microns diameter) dry mists or fogs are produced. These, due to their slow rate of settling out of suspension, and inability, except at high velocity, to burst on the surfaces with which they come into contact, travel for considerable distances from the sprayer. Such particles eventually disappear due to evaporation or settle out of suspension on to the tops of horizontal surfaces. In addition to their dispersible nature, aerosols, by virtue of their large surface area/volume ratio, are also an effective means of rapidly building up high vapour concentrations of volatile substances.

These characteristics of aerosols suggest their use for surface disinfection purposes in two principal ways. Firstly, by using large particles of a non-volatile disinfectant solution, dust laying germicidal films could be deposited on horizontal surfaces from a distance. Secondly, by using small aerosol particles of a volatile disinfectant, vapour concentrations high enough to fumigate rooms and their contents could be rapidly obtained and distributed. The tests to be described were made to determine whether the microsol aerosol generator was suitable for the production of aerosols of these types and its possible application to poultry hygiene.

Apparatus

(1) *The Microsol 202 Aerosol Generator*

This is a portable unit weighing 12 lb. and is electrically operated. The spray solution is spun out of rotating discs in a thin film which is broken up into aerosol sized particles by a high velocity jet of air impinging on the edge of the discs. The size of the particles produced can be varied from 5 to 125 microns by means of a control lever. The lever moves over a scale numbered 0 to 5 on the body of the machine which indicates the particle size selected. The output obtained is related to the particle size and is approximately 10 fl. oz. per minute when the largest size of particles is generated.

(2) *The test room*

The tests, unless otherwise stated, were made in a room of 800 cu. ft. capacity with a floor space of 94 sq. ft. During the tests the room was unventilated. The temperature and humidity were determined before each test by means of a whirling hygrometer.

1. Surface Disinfection

(a) *The disinfection of the top of horizontal surfaces using large aerosols of low volatility.*

Method and Materials

The spray solutions tested were composed of an aqueous solution of triethylene glycol (TEG) in combination with either hexachlorophene*, chloroxylenol or CTAB (cetyl trimethyl ammonium bromide). For the solutions containing hexachlorophene the pure substance was used. In the case of the chloroxylenol the commerical disinfectant Ibcol† was used which contains 4 per cent. of a chloroxylenol mixture. CTAB was used in the form of Bromat‡ which consists of 50 per cent. CTAB together with a solubiliser.

A large size aerosol (No. 5) was generated in order to ensure a fairly rapid settling out on the surfaces to be disinfected. For the same reason the relatively non-volatile substance triethylene glycol (TEG) was used as a germicide base to minimise reduction in particle size due to evaporation.

* Messrs. Givaudan & Co. Ltd., Whyteleafe, Surrey.
† Messrs. Ibbetson, London.
‡ Fine Organics, Inc., New York.

The test surfaces consisted of 9 cm. agar plates which were flooded with 1 ml. of a 1 : 100,000 and 1 : 200,000 aqueous dilution of 24-hour broth cultures of either *Salmonella pullorum* or *Escherichia coli* and then dried to remove excess moisture. The plates, apart from those serving as controls, were exposed in quadruplicate at ground level to the aerosols tested. The sprayer was sited 10 ft. from the plates and directed away from them. The plates were exposed immediately after generation of aerosol was complete and left exposed for 30 minutes by which time the bulk of the aerosol had settled out. The plates were incubated overnight at 37° C. and the number of colonies per plate were counted.

Results

These results show that Ibcol 60 per cent. with TEG 40 per cent. generated in the proportion of 4 fl. oz. per 100 sq. ft., and hexachlorophene 4 per cent. in a 40 per cent. solution of TEG generated in the proportion of 2½ fl. oz. per 100 sq. ft., both gave a satisfactory inhibition of growth. The failure of the Bromat to inhibit growth was considered due to its surface active properties which resulted in its absorption and dilution by the media on the plates. It was noted that whereas with the other spray solutions used a visible film was present on the test surfaces after 30 minutes' exposure to the aerosol, no film was present in the case of the plates exposed to the Bromat aerosol although adjacent non-porous surfaces were coated with a film. The effectiveness of quaternary ammonium compounds of the CTAB type for surface disinfection will therefore tend to be influenced greatly by the porosity of the surface being treated.

(b) *The persistence of germicidal activity in TEG based antiseptic films.*

Method and Materials

A series of 9 cm. Petri lids were exposed horizontally at a height 3 ft. from the ground to two germicidal aerosols generated in the proportion of 4 fl. oz. of spray solution to 100 sq. ft. floor space. The aerosols were generated in the largest particle size (No. 5) as in the previous test. Two solutions were used in the tests, (a) Ibcol 60 per cent., TEG 40 per cent. and (b) Bromat 0.6 per cent., TEG 40 per cent. and water 59.4 per cent. The lids were subsequently left exposed to the atmosphere of an incubator room for up to 17 days. The temperature of this room was maintained at 70° F. during the test and the relative humidity was kept in the region of 53 per cent. The persistence of germicidal activity in the deposited film was determined by removing lids at intervals of two to five days and placing on their surface 1 ml. of an overnight broth culture of *Staph. pyogenes*, which was mixed with the surface film using a platinum wire. 0.02 ml. samples of this suspension were removed at hourly intervals and the number of viable bacteria remaining in them was determined by the method of Miles & Misra (1938). Similar counts were also made on each broth culture used.

TABLE I

THE BACTERIOSTATIC EFFECT OF AEROSOLS WHEN DEPOSITED AS A FILM ON HORIZONTAL SURFACES INFECTED WITH MOIST BACTERIA

Vol. of spray solution used (fl. oz. per 100 sq. ft. floor area).	Composition of spray solution per cent.	Test temperature ° F.	Relative humidity per cent.	Mean per cent. reduction in bacterial count in exposed plates compared with controls	
				S. pullorum	*E. coli*
1	Ibcol 40 TEG 40 Water 20	68·5	43	Nil	Nil
2	Ibcol 60 TEG 40	65	52	—	39
4	Ibcol 64 TEG 36	69	48	87	—
4	Ibcol 60 TEG 40	70·5	53	95	—
2	Hexachlorophene 0·25 TEG 40 Water 59·75	62	56	—	Nil
2·5	Hexachlorophene 4 TEG 40 Water 56	62	56	92	—
4	Bromat 0·6 TEG 40 Water 59·4	72	54	Nil	—

Results. (See Table II overleaf)

The results showed that only a small decrease occurred in the bactericidal activity of the Ibcol film after 17 days' exposure at which time it was still capable of producing a 99 per cent. reduction in the number of bacteria placed on its surface after one

TABLE II

THE EFFECT OF AGE ON THE BACTERICIDAL ACTIVITY OF AEROSOL DEPOSITED FILMS, AS MEASURED BY THEIR EFFECT ON SUPERIMPOSED *Staph. pyogenes* BROTH SUSPENSIONS

Test Number	Number of bacteria in broth culture used in test millions/ml.	Age of film days	Number of bacteria remaining on surfaces exposed to Bromat aerosol. Millions/ml.				Number of bacteria remaining on surfaces exposed to Ibcol aerosol. Millions/ml.			
			Duration of contact of film with culture				Duration of contact of film with culture			
			1 hr.	2 hr.	3 hr.	4 hr.	1 hr.	2 hr.	3 hr.	4 hr.
1	300	0	0·056	0·026	0·014	—	Nil	Nil	Nil	—
2	36	2	0·045	0·042	0·04	—	0·400	0·12	0·84	—
3	130	4	0·205	0·115	—	0·041	0·665	0·113	—	0·045
4	65	6	1·5	1·9	—	0·7	0·900	0·55	—	0·045
5	125	10	100	55	—	85	1·400	1·0	—	0·9
6	80	12	65	—	7·5	—	1·050	—	0·95	—
7	250	17	180	115	—	150	3·123	1·800	—	2·500

hour's contact. The Bromat film, however, was found to lose its activity at a quicker rate and was capable of producing only a 20 per cent. reduction after 10 days' exposure to the atmosphere. The result was contrary to that expected as it was considered that the low volatility of CTAB, in common with most quaternary ammonium compounds, would enhance its persistence. A possible explanation of this loss of activity is that it could have resulted from the absorption and fixing of the CTAB by the particles of dust and fluff which settled on the test surfaces during the period of exposure to the atmosphere.

(c) *Disinfection of surfaces other than horizontal with aerosols of low volatility*

Methods and Materials

The test was made in a 25 cu. ft. capacity incubator at 71° F. and 40 per cent. relative humidity with fan and heaters switched off. The test surfaces consisted of glass coverslips 1 cm. square which were spotted with 0.02 ml. of an overnight culture of *S. pullorum*. After being allowed to dry at room temperature these were fixed in triplicate on each of the walls, floor and ceiling of the incubator. Replicate coverslips were placed adjacent to each other Two fl. oz. of Ibcol 60 per cent., ethylene glycol 40 per cent. was used to generate a medium sized aerosol (No. 4.5) in the incubator. The aerosol machine was placed inside the incubator with the doors closed, facing the back left hand corner and was run for one minute to generate the aerosol, and run empty for five minutes in order to recirculate the aerosol particles. The incubator was left closed for 90 minutes after which the coverslips were removed and placed in 1 ml. portions of nutrient broth contained in 1 oz. bottles. The bottles were well shaken and after 30 minutes the contents of the bottles were transferred to agar plates and broth, being spread over the surface of the plates with a platinum wire. Three control coverslips which were not exposed in the incubator were treated the same way. The plates were incubated overnight at 37° C. when the numbers of colonies on them were counted.

Results (See Table III overleaf)

The results show that maximum disinfection apart from horizontal surfaces occurred on vertical surfaces facing the aerosol machine. These were the only surfaces on which a visible film had been deposited. On the other surfaces the disinfecting action appeared to be slight and as no aerosol particles appeared to have been deposited on them, the disinfection which did occur is considered to have resulted from their exposure to the germicidal vapour arising from those surfaces on which a disinfectant film had been deposited.

Further tests showed that when the aerosol machine was held 1 ft. away from a vertical surface and producing particles of the largest size (No. 5) a large proportion of the aerosol particles generated were deposited as a film. When the machine was placed further away from the surface proportionately less of the aerosol particles were deposited so that at a distance of 10 ft., although some particles were deposited, the majority of the particles generated rebounded from the surface or were deflected from it by the turbulence of the atmosphere caused by the machine. These tests were made using a glycol based solution of low volatility. If an aqueous solution had been used the decline in the proportion of particles depositing on vertical surfaces with increase in distance would have been even greater due to loss by evaporation.

(d) *Disinfection of surfaces remote from sprayer with volatile aerosols*

Method and Materials

Formaldehyde gas was produced by evaporation from a formalin aerosol of small particle size (No. 3·5) which was generated in the proportion of 2 fl. oz. per 100 cu. ft. air space. The test surfaces were identical with those used in the previous test. The aerosol generator was allowed to run empty for 10 minutes after generating the aerosol in order to circulate the gas. The test was carried out at 68° F. and at 51 per cent. relative humidity in an incubator room. After one hour the formaldehyde in the room was removed by placing "880" ammonia solution on the floor in the proportion of 1 fl. oz. per 100 cu. ft. air space. The use of ammonia for this purpose has been reported in a previous publication (Harry, 1954). The aerosol generator was run for 10 minutes to circulate the ammonia gas which evaporated from the floor surface. The test surfaces were then removed and placed in 1 oz. bottles containing 1 ml.

TABLE III

THE EFFECT OF DISTANCE AND PLANE OF INFECTED SURFACES, RELATIVE TO AEROSOL GENERATOR ON THE BACTERICIDAL ACTIVITY OF AN AEROSOL OF LOW VOLATILITY (IBCOL 60 PER CENT., ETHYLENE GLYCOL 40 PER CENT.) GENERATED FROM A FIXED POSITION IN AN INCUBATOR

Location of surfaces	Distance of test surfaces from front of aerosol machine	Angle of incidence of long axis of aerosol machine to test surface	Growth of *S. pullorum* on plates
Controls			Confluent growth " " " "
Left wall	24 in.	90°	180 colonies 158 " 220 "
Right wall	18 in.	145°	Not confluent but uncountable " " " " " " " "
Front wall (behind aerosol machine)	20 in.	100°	40 colonies 220 " 350 "
Back wall (facing aerosol machine) ...	22 in.	10°	Nil " "
Ceiling	28 in.	150°	Not confluent but uncountable " " " " " " " "
Floor	18 in.	90°	Nil " "

of broth and were shaken over a period of 30 minutes. The broth suspensions were incubated for 48 hours to test for sterility. The bacterial content of one suspension from each group before incubation was determined by the method of Miles & Misra (1938). In the case of the three unexposed control surfaces dilution counts were made on two of the broth suspensions.

Results (See Table IV)

The results demonstrate the ability of a volatile aerosol to reduce bacterial contamination on all surfaces, as a result of the disinfecting action being due to the gas or vapour produced by the evaporation of the particle and thus being independent of the effects of gravity or directional velocity. The reduction in bacteria obtained suggests that complete sterilisation on all surfaces would have been possible by an increase in the amount of formalin generated or in the time of exposure. It is considered possible that if the period of exposure is prolonged over a number of days disinfection of surfaces could be obtained with much lower concentrations of germicidal vapour or gas.

TABLE IV

THE EFFECT OF DISTANCE AND PLANE OF INFECTED SURFACES, RELATIVE TO AEROSOL GENERATOR ON THE BACTERICIDAL ACTIVITY OF AN AEROSOL OF HIGH VOLATILITY (FORMALIN) GENERATED FROM A FIXED POSITION IN AN INCUBATOR ROOM

Location of surfaces	Distance of test surface from aerosol generator ft.	Number of *S. pullorum* on surface	Per cent. reduction on test surfaces compared with controls
Control		(*a*) 200,000 } Mean (*b*) 375,000 } 287,500	
Ceiling	20	550	99·8
Back of incubator exterior	4	300	99·8
Front of incubator exterior	16	285	99·8
Floor	14	Nil	100
Left wall	15	265	99·9
Right wall	15	150	99·9

2. The Laying and Disinfection of Dust

(a) *The Laying of Dust*

Method and Materials

The nature and persistence of the films produced on the tops of horizontal surfaces remote from the sprayer by the use of non-volatile large particle sized aerosols (No. 5), was determined using ethylene, diethylene and triethylene glycols. The amount of each generated was 1.7 fl. oz. per 100 sq. ft. floor space and the aerosol generator was operated from ground level. The temperature of the test room was 70° F. and the relative humidity 44 per cent. Petri lids were exposed on horizontal surfaces 6 ft. above ground level and also at ground level, during and for 30 minutes after spraying. Lids were exposed with and without a layer of chick fluff on their surfaces. The exposed lids were examined for density of film and its persistence when exposed to the atmosphere for a number of days. The extent to which the fluff was adherent on the exposed surface was determined by inverting the plates, shaking gently, and noting the amount of fluff that was dislodged.

Results

The persistence of the deposited film was found to vary with the type of glycol used. Ethylene glycol was found to persist for less than 24 hours, the di- and triethylene glycols were more persistent. The triethylene glycol film was found to be still adhesive after one month's exposure to the atmosphere.

When the film was deposited on fluff covered surfaces the fluff was fixed to the surfaces and remained so for over a month. This result was obtained with each of the glycols tested and did not appear to be related to the volatility of the particular glycol used.

The density of the film deposited appeared the same with each glycol used and was greater on lids exposed at floor level.

(b) *The Disinfection of Dust*

Methods and Materials

Samples of infected dust for the tests were obtained by grinding sterilised chick fluff to a fine powder and mixing it with an aqueous suspension of agar slope cultures of the test organisms. Initial tests were made with *E. coli* in which the fluff suspension was dried, ground to a fine powder and spread on Petri lids. These were then scraped with a glass slide so as to remove the loosely attached dust and leave a thin uniform film. The bacterial content of replicate dust samples prepared by this method had a high mean deviation, and therefore in subsequent tests using *S. pullorum* as test organism, dust samples were prepared by a different method. In these tests the fluff suspension was diluted with sterile water until a fluid suspension was obtained, 1 ml. portions of this were spread on Petri lids which were then dried for 30 minutes in a ventilated incubator at 37° C. It was found that by this method the agreement between replicate samples was increased. In one sample, however, a high mean deviation was obtained, but this was due to an increase in sampling error resulting from only a few organisms being present in the lowest dilutions tested. The germicidal solutions tested were generated in the form of large aerosol particles (No. 5) in the proportion of 4 fl. oz. per 100 sq. ft. of floor space. The aerosol was generated at ground level. Dust samples were exposed, at 5 ft. above ground level in the test room, for 30 minutes to the various aerosols tested. Estimation of the numbers of surviving bacteria in test and control samples were then made on duplicate samples 4 or 24 hours later. The dust samples were suspended on the lids in 20 ml. of nutrient broth and transferred to 1 oz. bottles containing glass beads. The bottles were shaken for one minute and allowed to stand for 30 minutes. The bacterial count for each broth suspension was determined by the method of Miles & Misra (1938). The broth used for the dilutions and the initial suspension of the dust samples contained 0.07 per cent. lecithin and 0.5 per cent. Tween " 80 " to inhibit possible bacteriostatic effects. The original broth suspensions were incubated in addition to the dilutions, since if less than 1,000 viable organisms remained in the dust samples no growth would appear on the dilution plates.

Results (See Tables V & VI overleaf)

The results of these tests showed that both aerosols when generated in the proportion of 4 fl. oz. per 100 sq. ft. were capable of almost complete sterilisation within 24 hours of surfaces coated with *S. pullorum* infected dust. Comparisons of the numbers of organisms remaining after 4 and 24 hours indicated that the disinfection process was a progressive one.

Discussion

(a) Significance of the particle size, volatility and directional velocity of aerosols on their effectiveness in disinfecting surfaces.

The tests described indicate the possible applications to surface sterilisation and the laying and disinfection of dust, of aerosols produced by the Microsol aerosol generator. It has been shown that the effect of the aerosol generated depends not only on its chemical constitution but on its particle size and other physical characteristics.

For the disinfection of horizontal surfaces, and the establishment of a dust-adhesive germicidal film, it was found that an aerosol of large particle size was suitable with its active germicidal component incorporated in a solvent of low volatility such as triethylene glycol. For the disinfection of vertical surfaces, aerosols of smaller size composed of a volatile germicide, such as formalin, were found suitable. It was found that the type of aerosol used for depositing germicidal films on horizontal surfaces could not be used successfully for similarly disinfecting vertical surfaces. This was due to these particles, being insufficiently heavy to normally acquire enough momentum to burst and adhere on vertical surfaces. The exception occurs when their velocity is very high such as immediately after leaving the aerosol generator. For the disinfection of surfaces by wet films of germicide using aerosols it is therefore necessary to place the aerosol generator within a few feet of the surface to be disinfected. Even under these conditions a considerable proportion of the aerosol rebounds off the surface into the atmosphere. It is

TABLE V

THE BACTERICIDAL EFFECT AFTER 24 HOURS CONTACT OF AEROSOLS DEPOSITED AS A FILM ON *E. coli* INFECTED DUST. TEMPERATURE 66° F. 50 PER CENT. RELATIVE HUMIDITY

Treatment of dust sample	Count of viable *E. coli* in dust samples	Mean count	Deviation from mean per cent.	Mean per cent. reduction in count of test samples relative to control mean
Unexposed Controls	223,000 145,000	184,000	± 21·2	
Exposed to :— Ibcol 60 per cent. TEG 40 „	10,300 29,300	19,800	± 48·0	89
Exposed to :— Bromat 0·12 per cent. TEG 40 „ Water 58·8 „	19,300 21,000	20,150	± 4·2	89

considered, therefore, that disinfection of this type is better carried out by a directional type of sprayer producing larger sized droplet particles.

The particular value of surface sterilisation by aerosols is due to the extent to which aerosols can be dispersed compared with the larger droplet sized particles which quickly settle out of suspension. This characteristic of aerosols is enhanced by the mode of operation of the Microsol generator which produces aerosols of higher velocity than most other generators, and also by means of the aerial turbulence it produces, results in non-directional dispersal. It was found that in large poultry houses of 6,000 cu. ft. capacity, a Microsol generator placed at a fixed point at one end of the building was capable of evenly distributing an aerosol throughout the building within a few minutes. This enables surfaces on which fluff and dust normally settle, such as the tops of roof ledges, lamp shades and incubators, etc., which are difficult of access, to be quickly disinfected with the minimum amount of labour.

(b) *The value of dust disinfection for restricting the transmission of disease.*

There are a number of references in the literature to the presence and persistence in dust of pathogenic bacteria (Winslow & Kligler, 1912; Pressman, 1937; Thomas, 1941; Crosbie & Wright, 1941; Garrod, 1944; Lidwell & Lawbury, 1950) and viruses (Edward, 1941; Downie & Dumbell, 1947). Evidence has also been obtained of infection having arisen from contact with dust-borne organisms (White, 1936; Lange & Nowosselsky, 1925).

It is considered, therefore, that the disinfection of dust-collecting surfaces would help considerably to reduce the risk of transfer of infection between individual birds, and between one group of birds and subsequent groups hatched or housed in the same premises. The immobilisation and disinfection of dust particles is important also when atmospheric disinfection is attempted, as the low non-toxic concentrations of germicidal vapour suitable for sterilising small aggregates of bacteria have been

TABLE VI

THE BACTERICIDAL EFFECT AFTER 4 AND 24 HOURS CONTACT OF AEROSOLS DEPOSITED AS A FILM ON *Salm. pullorum* INFECTED DUST. TEMPERATURE 64° F. 63 PER CENT. RELATIVE HUMIDITY

Treatment of dust sample	Duration of contact period hrs.	Count of viable *S. pullorum* in dust samples (× 10^6)	Mean count (× 10^6)	Deviation from mean per cent.	Mean per cent. reduction in count of test samples relative to control mean
Unexposed Controls	4	28 25	26·5	± 5·7	—
	24	0·160 0·182	0·171	± 6·4	
Exposed to :— Ibcol 60 per cent TEG 40 „	4	0·82 0·57	0·685	± 18·0	97·4
	24	Nil Nil } On dilution plates. Recovered *S. pullorum* from broth culture	<0·001		>99·4
Exposed to :— Bromat 0·6 per cent. TEG 40 „ Water 59·4 „	4	0·56 0·58	0·57	± 1·7	97·9
	24	0·001 0·002	0·0015	± 33·3	99·1

found to have little action on relatively large infected dust particles in aerial suspension (Hamburger *et al.*, 1945 (a) and (b); Puck *et al.*, 1945; Lovelock & Raymond, 1948; Dumbell *et al.*, 1948).

(c) *The use of the Microsol aerosol generator for fumigation.*

Rapid dispersal and high output rate makes the Microsol generator very suitable for the disinfection of surfaces with volatile disinfectants. In the case of the disinfection of a room with formaldehyde, the machine was found to build up a germicidal concentration of the gas on all surfaces when the generator was operated from a fixed point in the room by remote control from a switch outside. Distribution of the gas and its subsequent removal with ammonia was found to be assisted by allowing the air to recirculate through the empty generator. The high output rate of the generator would be particularly advantageous in buildings which cannot be completely sealed and thus allow a certain amount of aerosol to escape. In such buildings the accumulation of effective concentrations of germicide on surfaces would be conditional on the rate of generation of aerosol being greatly in excess of that lost by diffusion to the outside air. It is possible, under certain conditions where ventilation is restricted, that surface disinfection of this type could also be accomplished by prolonged exposure of the surfaces to low non-toxic concentrations of germicide vapour.

(d) *Relative merits of the chemicals tested for the disinfection of surfaces and immobilisation of dust.*

Of the germicides tested, chloroxylenol appeared satisfactory for surface sterilisation and the tests made with hexachlorophene suggested that other phenolic disinfectants with similar physical characteristics would be suitable for the same purpose. This is in agreement with the findings of Boocock (1951) using Octyl cresol and Lister & Dunklin (1955) using orthophenylphenol. Aerosols with a high degree of surface activity such as those containing quaternary ammonium compounds were not found suitable for producing a residual germicidal film on absorbent surfaces owing to their penetration and dilution in the subsurface layers.

For the production of dust-adhesive films in conjunction with a germicide, ethylene glycol was found suitable where a film of short persistence was required and triethylene glycol where a more persistent film was needed.

(e) *Suggested procedures for the disinfection of surfaces and immobilisation of dust by means of the Microsol aerosol generator.*

The results of the tests described suggest that aerosols produced by the Microsol generator could be effectively utilised in a routine for restricting the transmission of disease in hatcheries, broiler houses and other farm premises. In buildings such as these, immobilisation and disinfection of dust on the upper surfaces of lamps, roof beams and incubators, etc., can be achieved by generating in the form of large aerosol particles (No. 5), 4 fl. oz. of a solution consisting of six parts of Ibcol and four parts of triethylene glycol per 100 sq. ft. of floor space. If the building is less than 6,000 cu. ft. capacity the aerosol can be generated from one end of the building. With larger buildings generation from a number of points is required. The frequency of renewal of the dust-laying film on such surfaces will depend on the rate at which fluff or dust is generated and the extent to which it is carried up from ground level. In hatcheries under normal conditions of management this should not require to be renewed more often than once a fortnight, especially if atmospheric disinfection using a glycol based antiseptic is carried out at daily intervals. It is considered that such a procedure would be of particular value where incubators with combined setting and hatching compartments are used. It is recognised that with such machines the use of the high concentrations of formaldehyde required for efficient fumigation of the hatcher (Lancaster *et al.*, 1954, P.S.I.P. 1955/56) may not be practicable owing to the need to avoid fumigating eggs during the early stages of incubation. The use in such cases of an alternative method to minimise the risk of transmission of infection by infected fluff is therefore advisable. In the case of broiler houses and other farm premises, dust should be immobilised and disinfected whenever a diseased animal is located and removed or before new stock are accommodated. A disinfection process of this type would also be of use in rooms used as laboratories and animal surgeries where a likelihood exists of infectious material being disseminated and where the design of the room allows dust to collect in inaccessible places.

The use of aerosols of volatile germicides such as formalin for the disinfecton of all surfaces is indicated when premises are temporarily out of use. This occurs at regular intervals in broiler houses and opportunity should be taken on such occasions for a disinfection of this type. A small aerosol size is required (No. 3—4) and at least 2 fl. oz. of formalin should be used per 100 cu. ft. air space.

Summary

(1) The use of the Microsol aerosol generator for the disinfection of surfaces, deposition of germicidal films and the immobilisation and disinfection of dust particles has been described, and its application to disease control in hatcheries, broiler houses and other farm buildings has been commented on.

(2) It has been shown that the mode of action of the aerosols generated depends to a large extent on their physical characteristics.

(3) An aerosol of large particle size composed of six parts Ibcol and four parts triethylene glycol when generated in a concentration of 4 fl. oz. per 100 sq. ft. has been shown to be effective for depositing a dust-adhesive disinfectant film on horizontal surfaces.

(4) A film of the above composition was found capable of retaining its adhesive properties for at least one month on non-absorbent surfaces and its disinfecting activity was only slightly reduced after 17 days. It was also found to have a marked disinfecting activity on *S. pullorum* infected dust.

(5) An aerosol of small particle size composed of a volatile germicide such as formalin was found effective

(*Concluded at foot of col. 1 overleaf*)

Current Literature

ABSTRACTS

The Control of Chronic Respiratory Disease of Chickens. CRAWLEY, J. F., & FAHEY, J. E. (1955). *Poult. Sci.* **34.** 707-716.

The authors review our present knowledge of chronic respiratory disease (CRD) of chickens, a disease that is widespread in Canada and the U.S.A. and is considered to be a major cause of financial loss in both countries.

They believe that the aetiology of the disease involves both pleuropneumonia-like organisms (PPLO) and a virus. Thus birds infected with PPLO alone show only mild respiratory symptoms, without the air sac lesions and loss of weight that characterise naturally occurring outbreaks of CRD. PPLO are present in practically all field cases of CRD, but can also be isolated from apparently normal birds. Both agents can be transmitted *via* the egg, but it appears that air-borne transmission also occurs. PPLO infections can be detected by means of a haemagglutination inhibition (HI) test.

Several workers have treated outbreaks of CRD by feeding high levels of antibiotics in the food (*e.g.*, aureomycin or terramycin at the rate of 200 to 400 grammes per ton). Such treatment is of little value in controlling the disease, but may confer some benefit by suppressing secondary bacterial infections. The parenteral use of antibiotics holds greater promise. Thus infected hens show a rise in egg yield and a temporary cessation of respiratory symptoms following injection with a penicillin-streptomycin mixture, and PPLO-free chicks can be reared from hens treated in this way.

The measures advocated by the authors for the control of the disease in breeding stock are based on the elimination of the PPLO fraction of the aetiological complex. The extent of infection is first determined by use of the PPLO HI test. The birds are then injected with 150 to 200 mg. of streptomycin plus 150,000 units of penicillin. If the respiratory symptoms persist, the treatment can be repeated one week later, but the possible presence of other infections (*e.g.*, Newcastle disease or infectious bronchitis) should then be considered. If a marked improvement is given, eggs are collected during the following two to three weeks, carefully disinfected, and incubated and reared in isolation to give replacement stock. The PPLO HI test is used to check that the chicks reared in this way are free from infection.

Furazolidone in the Treatment of an Outbreak of Fowl Typhoid in Chickens. LUCAS, F. R. (1955). *Poult. Sci.* **34.** 440-442.

The author described the treatment of an outbreak of fowl typhoid in which 12 out of a flock of 75 birds had died during a period of one week. Only two further deaths occurred after the addition of 0.011 per cent. of furazolidone to the mash. The treatment was continued for 14 days. [No negative controls were kept.—*Abstractor.*]

Twenty-four days after the termination of treatment the egg yield was increasing and the birds appeared to be normal, but when three birds were killed for examination all three gave positive reactions to an agglutination test and yielded growths of *Salmonella gallinarum* on cultural examination.

Chronic Respiratory Disease of Ducks. FAHEY, J. E. (1955). *Poult. Sci.* **34.** 397-399.

The author remarks that although chronic respiratory disease (CRD) in chickens and turkeys has been described on many occasions, little attention has been paid to a similar condition occurring in ducks.

He describes an outbreak in a group of two-week-old ducklings. The condition was characterised by depression, sneezing and some head shaking. Less than 5 per cent. of the birds died, but the remainder became unthrifty.

When material from the respiratory tract was examined by passage in embryonating eggs two distinct entities were isolated—a pleuropneumonia-like organism and an organism that is believed to be a virus. The latter produced lesions of CRD in experimental chickens, suggesting that the two diseases may share a common factor.

E. A. G.

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in disinfecting surfaces other than horizontal ones. 2 fl. oz. per 100 cu. ft. air space was found capable of producing a minimum of 99.8 per cent. reduction in the numbers of *S. pullorum* on the interior surfaces of an incubator room.

Acknowledgments: I wish to thank Miss J. Wells for her technical assistance and Microsol Industries Ltd., for the loan of a "202" aerosol generator. The work was carried out with the assistance of a grant from the Agricultural Research Council.

References

BOOCOCK, D. (1951). *Man. Chem.* 22.
CROSBIE, W. E., & WRIGHT, H. D. (1941). *Lancet.* **1.** 656.
DOWNIE, A. W., & DUMBELL, K. R. (1947). *Ibid.* **1.** 550.
DUMBELL, K. R., LOVELOCK, J. E., & LOWBURY, E. J. (1948). *Ibid.* **2.** 183.
EDWARD, D. G. (1941). *Ibid.* **2.** 664.
GARROD, L. P. (1944). *Brit. med. J.* **1.** 245.
HAMBURGER, M., PUCK, T. T., & ROBERTSON, O. H. (1945) (*a*) *J. Infect. Dis.* **76.** 208.
———, HURST, V., ROBERTSON, O.H., & PUCK, T. T. (1945) (*b*) *Ibid.* **77.** 177.
HARRY, E. G. (1954). *Brit. Vet. J.* **110.** 9, 380.
LANCASTER, J. E., GORDON, R. F., & HARRY, E. G. (1954). *Ibid.* **110.** 6. 238.
LANGE, B., & NOWESSELSKY, W. (1925). *Z. Hyg. Infektkr.* **104.** 286.
LESTER, W., & DUNKLIN, E. W. (1955). *J. Inf. Dis.* **96.** 40.
LOVELOCK, J. E., & RAYMOND, W. F. (1948). *Studies in Air Hygiene. M.R.C. Spec. Rept.* 262, 152.
MILES, A. A., & MISRA, S. S. (1938). *J. Hyg. Camb.* **38.** 732.
P.S.I.P. REGULATIONS (1955–56). *Min. of Ag., Fish. and Food (Lond.).*
PUCK, T. T., HAMBURGER, M., ROBERTSON, O. H., & HURST, V. (1945). *J. Inf. Dis.* **76.** 216.
PRESSMAN, R. (1937). *Amer. Rev. Tuberc.* **35.** 815.
THOMAS, J. C. (1941). *Lancet.* **1.** 433.
WHITE, E. (1936). *Ibid.* **1.** 941.
WINSLOW, C. E. A., & KLIGLER, I. J. (1912). *Amer. J. Publ. Hlth.* **2.** 663.

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AREA ERADICATION PLAN FOR TUBERCULOSIS

STATEMENT SHOWING THE POSITION OF ATTESTED HERDS IN EACH COUNTY AS AT OCTOBER 1ST, 1955.

Good progress continues to be made in eradicating bovine tuberculosis from cattle in Great Britain. Approximately 60 per cent. of cattle in the country are now attested, as against under 50 per cent. a year ago. During the past year the rate of voluntary attestation has been nearly double that of previous years, with the result that about one million additional cattle have become attested.

	Total cattle on June 3rd 1955 (Provisional results)	Number of attested herds	Cattle in attested herds and areas: Number	Cattle in attested herds and areas: Percentage of total cattle
Great Britain	9,766,781	146,827	5,862,051	60
England & Wales	8,037,381	111,666	4,537,601	56
England	7,008,381	78,219	3,685,431	53
Wales	1,029,000	33,447	852,170	83
Scotland	1,729,400	35,161	1,324,450	77
England:				
Bedford	45,000	322	17,450	39
Berkshire	92,000	1,107	73,910	80
Buckinghamshire	119,000	1,062	60,330	51
Cambridge	33,000	228	16,700	51
Isle of Ely	21,000	68	3,560	17
Chester	247,000	2,572	118,080	48
Cornwall	285,000	3,835	121,700	43
Cumberland	238,000	4,850	238,000	100
Derby	187,000	1,592	74,100	40
Devon	428,000	6,222	242,090	57
Dorset	173,000	2,131	121,900	70
Durham	126,000	1,753	60,880	48
Essex	123,000	1,365	73,020	59
Gloucester	208,000	2,144	107,240	52
Hereford	151,000	2,349	85,850	57
Hertford	63,000	657	41,490	66
Huntingdon	29,000	167	8,010	28
Kent	123,000	1,453	66,350	54
Lancaster	277,000	4,335	164,740	60
Leicester	168,000	1,028	58,110	35
Lincoln:				
Parts of Holland	28,000	55	2,870	10
Parts of Kesteven	72,000	354	19,520	27
Parts of Lindsey	162,000	701	35,740	22
London	—	—	—	—
Middlesex	7,000	78	3,440	49
Norfolk	201,000	1,393	94,240	47
Northampton	149,000	796	48,220	32
Soke of Peterborough	7,000	34	2,360	34
Northumberland	214,000	1,251	75,540	35
Nottingham	112,000	803	40,600	36
Oxford	112,000	1,139	73,590	66
Rutland	21,000	67	3,590	17
Salop	299,000	2,958	147,290	49
Somerset	340,000	4,822	212,010	62
Southampton	163,000	2,306	128,580	79
Isle of Wight	23,000	481	19,280	84
Stafford	242,000	1,787	86,960	36
Suffolk, East	84,000	1,150	56,830	68
Suffolk, West	42,000	394	21,960	52
Surrey	56,000	933	41,430	74
Sussex, East	112,000	1,333	67,720	60
Sussex, West	82,000	950	58,870	72
Warwick	153,000	1,165	63,370	41
Westmorland	104,000	2,229	104,000	100
Wiltshire	222,000	2,221	151,760	68
Worcester	106,000	855	42,100	40
Yorks:				
East Riding	143,000	490	24,050	17
North Riding	267,000	3,474	129,370	48
West Riding	349,000	4,673	176,250	51
Isles of Scilly	381	87	381	100

	Total cattle on June 3rd 1955 (Provisional results)	Number of attested herds	Cattle in attested herds and areas	
			Number	Percentage of total cattle
Wales :				
Anglesey... ...	58,000	1,222	27,420	47
Brecon	52,000	1,922	52,000	100
Caernarvon ...	63,000	2,584	53,620	85
Cardigan ...	86,000	4,163	86,000	100
Carmarthen ...	148,000	6,296	148,000	100
Denbigh ...	108,000	2,558	74,330	69
Flint	62,000	778	30,130	49
Glamorgan ...	76,000	1,625	39,580	52
Merioneth ...	40,000	1,808	40,000	100
Monmouth ...	75,000	1,173	40,090	53
Montgomery ...	105,000	3,945	105,000	100
Pembroke ...	115,000	3,817	115,000	100
Radnor	41,000	1,556	41,000	100
Scotland :				
Aberdeen ...	253,200	1,972	87,700	35
Angus	71,000	429	35,360	50
Argyll	64,200	2,249	64,200	100
Ayr	164,200	2,323	164,200	100
Banff	62,200	541	23,780	38
Berwick ...	38,200	321	21,220	56
Bute	12,000	327	12,000	100
Caithness ...	28,400	1,042	20,910	74
Clackmannan ...	4,800	81	4,800	100
Dumfries ...	116,400	1,984	116,400	100
Dunbarton ...	18,600	353	18,600	100
East Lothian ...	18,400	171	10,520	57
Fife	72,800	1,085	72,800	100
Inverness ...	53,400	4,362	43,070	81
Kincardine ...	43,400	263	16,770	39
Kinross	10,800	178	10,800	100
Kirkcudbright ...	81,800	1,119	81,800	100
Lanark	100,400	1,772	100,400	100
Midlothian ...	26,200	543	26,200	100
Moray	34,200	420	19,600	57
Nairn	9,800	131	6,400	65
Orkney	50,200	1,384	29,540	59
Peebles	13,200	295	13,200	100
Perth	99,000	1,528	64,700	65
Renfrew	31,800	543	31,800	100
Ross-shire ...	41,800	4,134	32,400	78
Roxburgh ...	39,000	546	26,670	68
Selkirk	7,800	213	7,800	100
Stirling	46,400	883	46,400	100
Sutherland ...	9,800	1,102	8,410	86
West Lothian ...	17,000	344	17,000	100
Wigtown ...	82,200	902	82,200	100
Zetland	6,800	1,621	6,800	100

There were also 3,143 Supervised herds. These herds need only one clear tuberculin test to qualify as Attested Herds.

In Parliament

Myxomatosis

Mr. Sorensen asked the Minister of Agriculture, Fisheries and Food what areas are now held to be largely denuded of rabbits through the effect of myxomatosis; in what areas has the rabbit population not been seriously affected; what reports he has received of the disease not affecting rabbits in Epping Forest; how far evidence shows the existence of rabbits apparently now immune to the disease; and how far benefits accruing from the diminished ravages of rabbits have been counter-balanced by the increased depredation of foxes.

Mr. Amory: Apart from small areas in the Midlands, and the north, the whole of England and Wales has been largely denuded of wild rabbits as a result of myxomatosis. Although the disease spread slowly through Epping Forest, only a small number of healthy rabbits remain. The examination of surviving rabbits suggests that the number that has acquired immunity to the disease is less than 1 per cent. of the former rabbit population. Increased depredation by foxes has been insignificant compared with the benefit derived from the absence of rabbits.

Mr. Sorensen: While thanking the Minister for that reply, may I ask him whether we can take it that, in the very near future, we shall be able to say this country is entirely denuded of rabbits. May I further ask him whether any attention has been paid to possible depredations by foxes, and by buzzards and other birds?

Mr. Amory: I wish I knew myself the answer to the first part of the hon. Gentleman's supplementary question. As to the second part, I have had allegations of a good deal of additional damage by buzzards and stoats and weasels, but that does not affect the answer I gave, that the advantage from the disappearance of rabbits is overwhelming.

Mr. E. Fletcher: Is the right hon. Gentleman taking any special steps to deal with rabbits in Epping Forest?

Mr. Amory: Exactly the same course is being followed as in other areas. The county committee in Essex is watching the position very carefully and helping in every possible way.

Fowl Pest

Mr. Dye asked the Minister of Agriculture, Fisheries and Food the cost in compensation paid for the destruction of poultry in connection with the outbreaks of fowl pest during 1955 up to the latest available date.

Mr. Amory: The cost of compensation for poultry slaughtered and hatching eggs destroyed in the 569 outbreaks of fowl pest confirmed in 1955, up to November 24th, is approximately £280,000.

Mr. Dye: Is the right hon. Gentleman satisfied with the methods of control? Does not he think that if he had been ruthless at the beginning of the outbreaks this disease could have been stamped out much quicker, and with a great saving in compensation, which poultry keepers do not want?

Mr. Amory: I am never satisfied that arrangements are as good as I hoped they would be, but I would remind the hon. Member that one has to balance the risks against the unnecessary imposition of regulations which may cause very great losses to the producers concerned. I would also remind him that, to date this year, the total extent of this trouble and the total compensation paid out have been substantially less than was the case last year.

Mr. Dye: Is the Minister aware that, in Norfolk at any rate, farmers are very much against the present system of control and want a system very similar to that used in the case of foot-and-mouth disease?

Mr. Amory: I will certainly consider that; in fact I am doing so at the present time.

News and Comment

VETERINARY REVIEWS AND ANNOTATIONS

We should like to draw the attention of our readers to the publication, under this title, which has been begun by the Commonwealth Bureau of Animal Health. Published half yearly in two issues per volume, its price is 25s. per annum, or 15s. for single parts; and in these days, when the output of scientific literature is so great, this work will help both practitioners and laboratory workers to maintain a balanced view of the advances and the general state of knowledge on a wide variety of topics.

The first two issues, published respectively in April and October of this year, carry a number of distinguished names and cover fields ranging from intestinal diseases of young calves (Professor R. Lovell) to coccidial and other forms of parasitism in their relationship to poultry husbandry (C. Horton-Smith), and from a discussion on atrophic rhinitis (R. Gwatkin) to a paper on vitamin A and ovine rickets (A. B. Grant).

It was pleasant to learn that Veterinary Reviews and Annotations, for long a cherished project of Mr. W. A. Pool, previously Director for many years of the Commonwealth Bureau, made its appearance before his retirement. It is obtainable from the Central Sales Branch, Commonwealth Agricultural Bureaux, Farnham Royal, Nr. Slough, Bucks.

THE R.C.V.S. LIBRARY

The Library of the Royal College of Veterinary Surgeons will be closing at 2 p.m. on Friday, December 23rd, and will re-open at 10 a.m. on Wednesday, December 28th.

VETERINARY PUBLIC HEALTH IN FRANCE

Professor Vuillaume, Director of the Veterinary Services in France, informs us that following the recommendations of the Advisory Group of the World Health Organisation which met in June this year to consider education in veterinary public health, a new French law, dated November 10th, 1955, has been passed to provide for the inclusion of specialised veterinary public health studies in the regular curriculum of the veterinary school. The new requirements of the veterinary curriculum (a four-year course) provide that in the final year of studies the student must specialise for four months in one of the following major topics:—

1. Animal Husbandry and nutrition.
2. Industry and control of products of animal health.
3. Administrative and veterinary public health.

It is noteworthy that the Veterinary School in Zagreb established a Department of Veterinary Public Health a couple of years ago while several other schools in the United States have made similar provisions for veterinary public health education.

NEW R.C.V.S. LIBRARY CATALOGUE

We are indebted to the librarian for the following details:—

In 1936 the library of the R.C.V.S. produced a small catalogue of "Text-books published since 1900." In preparing the present edition of the catalogue it was felt that as so much useful material appeared in forms other than text-books the new edition of the catalogue should be more comprehensive. This edition of the catalogue includes books and reports published between 1900 and 1954, but excludes works of less than 50 pages, directories and general reference works, and with a few exceptions, theses. Where the library holds several editions of a book only the latest is listed. As much detail as possible has been included, so that a prospective borrower may know the size of the book he has asked for. The measurement in centimetres indicates the height of the book. All material received after December 31st, 1954, will be listed in annual supplements.

Lists of library accessions are published in THE VETERINARY RECORD at frequent intervals. The section showing periodicals comprises a complete list of the library's holdings with the exception of a few odd issues. The Reports and Yearbooks are only those currently received.

Readers may wish to be reminded that the library is open every weekday from 10 a.m. to 5 p.m. except Saturdays when it closes at 12 noon. It may be used by any person entered on a Register of the College and all *bona fide* scientific workers on introduction by a Fellow or Member or the Librarian of another recognised Library.

UNIVERSITY NEWS

Liverpool

At a Degree Ceremony held on December 14th, the degree of M.Sc. was conferred on Mr. R. B. Maneely, M.R.C.V.S., lecturer in veterinary histology.

THE CENTRAL VETERINARY SOCIETY

The Central Veterinary Society is to hold a forum discussion on the treatment of unusual veterinary patients on Thursday, January 5th, 1956, at the Royal Veterinary College, Camden Town. Members of the forum will make available their specialised knowledge to the practising veterinary surgeon in such a way as to make it possible for him to reapply this knowledge in his own practice.

It is hoped that there will be a large attendance at this meeting, but any practitioners who are not able to attend and who have specific questions they would like to ask, are invited to send these to the secretary of the Society, Mr. Bruce V. Jones, M.R.C.V.S., Veterinary Division, Allen & Hanburys Ltd., Bethnal Green, E.2. The questions can then be put to the forum.

Full details of this meeting appear in our notices column.

V.V.B.F. LADIES' GUILD, SCOTTISH METROPOLITAN DIVISION

A Supper Dance was held in the Adam Rooms of the George Hotel, Edinburgh, on November 23rd. The company of over 150 included local farmers, the representatives of several drug firms, and members of the local Division and their friends. The committee of ladies organising the function are to be congratulated on providing such an enjoyable evening's entertainment and many of those present expressed the hope that this would become an annual event. A sum of £61 12s. has been paid over to the Benevolent Fund.

A.I. AND BREED SOCIETIES

At a recent meeting of the Penrith Friesian Breeders, Mr. G. P. Ross, Scottish member of the British Friesian Breeders' Club, described bulls kept at A.I. centres in Great Britain as a menace to the breed societies.

Among the reasons advanced for this statement were that in common with other breeds, A.I. now served almost 50 per cent. of British Friesian cows in this country, not to mention the export of frozen semen for use abroad. This, in the speaker's view, was a staggering total when it was recalled that before the war there were twice as many bulls in use as now. The A.I. centres had not the same interest, the speaker went on, and did not look for conformation in a bull's qualities in the same way as did an individual breeder. The breed societies had lost control of the bulls at the M.M.B. centres and such animals were a menace to any breed society. For 40 years the Friesian Council had given thought to breed improvement, and now they found that 50 per cent. of pedigree cattle were outside the control and advice of the breed society. The situation could only be remedied by the M.M.B. working in close contact with the various breed societies whose bulls they were purchasing.

FOWL PEST

A number of outbreaks of fowl pest have been confirmed recently on premises in the "clean" area counties of Hereford, Monmouth and Glamorgan. The infected birds were obtained from markets at Hereford and Abergavenny and are among over 1,000 lots distributed from these markets over a large area of South Wales and Western England. Investigations and tracing of suspected consignments are in progress.

In order to prevent the spread of infection to other "clean" areas and to bring the situation under control, the Minister of Agriculture has made an Order covering the area specified below as from December 12:—

The Administrative Counties of Brecknock, Glamorgan, Hereford, Monmouth and Radnor. The City and County Boroughs of Cardiff and Gloucester. The County Boroughs of Merthyr Tydfil, Newport and Swansea.

In the County of Gloucester, the Petty Sessional Divisions of Coleford, Gloucester, Lydney, Newnham and Newent.

S. WALES DIVISION DINNER-DANCE

The annual Dinner Dance of the South Wales Division was held at the Seabank Hotel, Porthcawl, on October 14th, when 120 members and friends were present. Amongst the guests were Mr. E. Wilkinson, President of the B.V.A., and Mrs. Wilkinson, Mr. C. J. Cellan-Jones, President of the South Wales Branch of the British Medical Association, and Mrs. Cellan-Jones, Mr. and Mrs. Trevor Davies, Mr. and Mrs. Aubrey Morgan and Mr. D. T. Michael, representing the North Wales Division, and Miss Michael.

The loyal toast was proposed by the President of the Division, Mr. P. A. Mathew, who also proposed the toast to the B.V.A. Mr. Wilkinson, replying, thanked the Division for the invitation to attend this function, and wished it success. The Guests were proposed by Mr. D. B. Davies, Hon. Treasurer and President Elect of the Division, and Mr. Cellan-Jones replied. Mr. Trevor Davies spoke on behalf of the guests also.

During the dancing which followed, Mr. A. G. Beynon was M.C.

PERSONAL

Births

HEBELER.—On December 12th, 1955, to Sybil (*née* Palmer) wife of H. F. Hebeler, Langport, a son.

HORTON.—On November 18th, 1955, at Maternity Hospital, Thames, New Zealand, to Jean, wife of F. L. Horton, B.V.M.S., M.R.C.V.S., a daughter, Fiona Lindsay.

HYAM.—On December 4th, 1955, to Helmi, wife of R. I. C. Hyam, M.R.C.V.S., of Gravesend, a daughter, Melanie Anne, a sister for Richard.

PEARSON.—On November 27th, 1955, at Nairobi, Kenya, to Jean Margaret, wife of Ronald George, M.R.C.V.S., a daughter, Allison Jane.

Ministry of Agriculture, Veterinary Field Staff Changes

The Animal Health Division of the Ministry of Agriculture announce the following staff changes:—

Mr. A. J. Brown, B.SC., M.R.C.V.S., Veterinary Officer at Leeds, has been transferred to Skipton.

Mr. G. J. Crawford, M.R.C.V.S., Veterinary Officer at Settle, has been transferred to Aylesbury.

Mr. A. Ferguson, M.R.C.V.S., Veterinary Officer at Hereford, has been transferred to Oban.

Mr. G. I. Philp, M.R.C.V.S., Veterinary Officer at Newcastle, has been transferred to Wick.

The following members of the profession have been appointed to the permanent staff as Veterinary Officers:—

Messrs. P. J. Byrne, M.R.C.V.S., stationed at Preston; R. Hardy, M.R.C.V.S., stationed at Preston; D. G. H. Jones, B.SC., M.R.C.V.S., stationed at Hereford; Miss G. W. Shollick, M.R.C.V.S., stationed at Dorchester; Mr. R. H. Woods, M.R.C.V.S., stationed at Mold.

COMING EVENTS

December

29th (Thurs.). Annual Dance of the V.V.B.F. Ladies' Guild, Dumfries and Galloway Division, in the Cairndale Hotel, Dumfries.

January, 1956

5th (Thurs.). General Meeting of the Central Division, B.V.A., at the Royal Veterinary College, Camden Town, N.W.1, 6 p.m.

6th (Fri.). Annual Dinner and Dance of the North Wales Division, B.V.A., in the Imperial Hotel, Llandudno, 7 p.m.

Sixteenth Ordinary General Meeting of the A.V.T. and R.W.s at the Royal Veterinary College, Camden Town, N.W.1, 10 a.m.

11th (Wed.). General Meeting of the Lancashire Division, B.V.A., at the Queen Hotel, City Road, Chester, 2.30 p.m.

B.V.A. COUNCIL AND COMMITTEE MEETINGS IN LONDON

Wednesday, January 18th, 1956

10.30 a.m.—Home Appointments Committee, at 7, Mansfield Street, W.1.

12.00 noon—Parliamentary and Public Relations Committee at 7, Mansfield Street, W.1.

2.15 p.m.—Organising Committee, at 7, Mansfield Street, W.1.

Thursday, January 19th, 1956.

10.00 a.m.—Veterinary State Medicine Committee, at 7, Mansfield Street, W.1.

12.00 noon—Finance Sub-committee, at 7, Mansfield Street, W.1.

2.15 p.m. General Purposes and Finance Committee, at 7, Mansfield Street, W.1.

Friday, January 20th 1956.

10.30 a.m.—Meeting of Council at Connaught Rooms, Great Queen Street, W.C.2.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Angus. Eskhill Farm, By Forfar (Dec. 6).

Cumberland. Whitrigg Lees, Kirkbride, Carlisle (Dec. 6).

Denbigh. Yew Tree Farm, Rossett, Wrexham (Dec. 8).

Kirkcudbright. Ardwall Farm, Gatehouse of Fleet Castle Douglas (Dec. 7).

Lancs. Holmes Farm, Balderstone, Blackburn (Dec. 6).

Staffs. Far House Farm, Upper Hulme, Leek (Dec. 6).

Wilts. Well House Farm, Coombe Bissett, Salisbury (Dec. 8).

Yorks. Harton Lodge Farm, Harton (Dec. 7).

Fowl Pest

Essex. Slouth House Farm, Cressing Road, Braintree; Kenwood, Nevendon Road, Wickford (Dec. 7); Sydney House Stores, Nevendon Road, Wickford; 83, Mashsey Road, Little Yeldham, Halstead; 7, Kings Parade, Nevendon Road, Wickford (Dec. 8).

Glamorgan. 90, Craddock Street, Cardiff; Glyn Collen, Morriston, Swansea (Dec. 8).

Hereford. Fairfield, Fownhope (Dec. 7); Lower Hunthouse, Clodock; Garn Farm, Clodock (Dec. 8).

Herts. South Leigh, Tewin, Welwyn (Dec. 6).

Lancs. Balls Farm, Brook Lane, Little Hoole, Preston; Fairfield, Liverpool Road, Hutton, Preston (Dec. 6); Knoll Lane, Little Hoole, Preston; 40, Medlock Road, Woodhouses, Ashton-under-Lyne; South Cottage Farm, Chorley; Hall Trees Farm, Chipping, Preston (Dec. 7); Laoriston, Liverpool Road, Longton, Preston; Out Lane Farm, Liverpool New Road, Much Hoole, Preston (Dec. 8).

Middx. Allotments, Breakspear Road, Ruislip (Dec. 7).

Monmouth. Ty Deri Farm, Llanretherine, Abergavenny (Dec. 6); Vine Tree Cottage, Monkswood, Usk (Dec. 7); Little Parc, Llanvihangel-Crucorney, Abergavenny; 33, Cobden Street, Cross Keys; Kendon Farm, Crumlin, Newport; Upper Hafodarthen Farm, Aberbeeg, Abertillery; Rose Cottage, Trinant, Newport (Dec. 8).

Norfolk. Premises adjoining Police Station, Reepham, Norwich (Dec. 6); Rookery Farm, Winfarthing, Diss; Whitehouse Farm, Gunthorpe, Melton Constable (Dec. 7).

Suffolk. The Hollies, Barnby, Beccles; Bridewell Meadow, Clare, Sudbury (Dec. 8).

Sussex. 1, Dudley Cottages, Udimore, Rye (Dec. 6); The Police Station, Winchelsea (Dec. 8).

Swine Fever

Ches. Barlow House Farm, Poynten, Stockport (Dec. 6).

Cornwall. Trebullett, Lezant, Launceston (Dec. 7).

Derby. Slayley Hill Farm, Clowne Common, Chesterfield (Dec. 12).

Devon. Sandcombe Farm, Sidbury, Sidmouth (Dec. 12).

Dorset. Baylea Farm, High Wood, East Stoke, Wareham (Dec. 9); Mampitts Farm, Shaftesbury (Dec. 12).

Dunbarton. No. 12 Holding, West Cochno, Duntocher (Dec. 7).

Essex. Beechcroft Piggeries, Mill Street, Potter Street, Harlow (Dec. 7).

Glamorgan. Dolgoed, Grovesend, Gorseinon (Dec. 12).

Herts. Cutting Hill Farm, Benington, Stevenage (Dec. 7).

Lancs. Poulton Hall Farm, Poulton, Blackpool (Dec. 12).

Lanarks. Biggins Farm, Mossend, Bellshill (Dec. 9).

Norfolk. Abbey Farm, The Hythe, Methwold, Thetford (Dec. 9).

Somerset. Bladon Farm, Kingsbury Episcopi, Martock (Dec. 7).

Staffs. Rose Cottage, Kerry Hill, Bucknall, Stoke-on-Trent (Dec. 12).

Yorks. 151, Retford Road, Sheffield (Dec. 9); 12, Wren Street, Paddock, Huddersfield; Upper Brough Road, Paddock; 57, Cliff End Road, Longwood, Sheffield; Rockhill Farm, Brownhill Road, Batley (Dec. 12).

FRENCH STUDENTS

A second-year French veterinary student in Toulouse is anxious to obtain accommodation with a British veterinary surgeon to live with the family as a paying guest for about three weeks between July 10th and September 1st, 1956. He is particularly interested in horse and cattle practice, and he has seen some practice in France.

A 21-year-old daughter of a French veterinary surgeon would also like to spend the Easter holidays *au pair* or as a paying guest with a veterinary family in the London area. If any members are in a position to help these students would they kindly communicate with the General Secretary, B.V.A., at 7, Mansfield Street, Portland Place, London. W.1.

DUTCH RESEARCH INTO FOOT-AND-MOUTH DISEASE

A conference on foot-and-mouth disease was held in Amsterdam recently at the State Institute for Veterinary Research. Dr. H. S. Frenkel, Director of the Institute, said that the conference had been called by the Organisation for European Economic Co-operation at the request of the Food and Agricultural Organisation of the United Nations. He said that a method consisting of a virus cultivated without using the infection of living animals had already been successfully employed in various countries, including France and Italy, and this would be used in the State Laboratory.

With regard to the identification of the variants, several methods were discussed. The British laboratory at Pirbright, Surrey, had been appointed as the central institute for the identification of the foot-and-mouth disease viruses, and for the setting up of a collection of such agents, to be held at the disposal of laboratories producing vaccines or for research purposes.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

THE VALUE OF NITROFURAZONE AS A COCCIDIOSTATIC DRUG

Sir,—In your issue of December 3rd, 1955, Dr. Blount, while criticising some aspects of our investigation into the value of nitrofurazone, used as a coccidiostatic drug, indicates the importance of designing experimental work specifically to assist the poultry industry.

It should, of course, be quite evident that, at Weybridge, we are concerned with investigating the limitations of existing means of disease control solely with a view to their improvement and to devising new methods.

In this connection, I am glad to say that work at the Laboratory, on the synergism observed between pyrimethamine and the sulphonamides, used as coccidiostatic drugs, has proved extremely promising and will, we hope, lead to important advances in the chemotherapy of coccidiosis.

Our original observations, which indicated that as little as 25 parts per million of pyrimethamine might increase the effect of a sulphonamide by as much as tenfold, have already been reported—Joyner & Kendall (1955) and should be available to Dr. Blount. This original report will be followed, in the near future, by a further publication.

Yours faithfully,

S. B. KENDALL.

Ministry of Agriculture Veterinary Laboratory,
New Haw,
Weybridge,
Surrey.

December 8th, 1955.

Reference

JOYNER, L. P., & KENDALL, S. B. (1955). *Nature*. London. **176**. 975.

A NEW UROGRAPHIC CONTRAST MEDIUM

Sir,—With reference to the letter by L. Collery in the issue of December 3rd concerning our article on Hypaque we wish to make a few comments. Firstly, we find that with a compression band the visualisation is improved, although fair results are obtainable without. We were misquoted in part 3 when it was stated that we exposed plates at 25 kV, 250 mA. The facts are that the exposure used for the cat was 55 kV, and for the dog, 65 kV. Mr. Collery states that with 25-30 kV, 60 mA for 0.5 sec. adequate results were obtainable. In his original article (*Irish Vet. J.* **9**. No. 6), using Diaginol, he states that satisfactory plates were not obtained in dogs weighing over 35 lb. The dog described and illustrated in our article using Hypaque weighed 53 lb.

We are surprised to learn that useful radiographic results can be obtained with 25-30 kV, and 60 mA for 0.5 sec. (30 mA sec.), and in order to acquaint ourselves with the possibilities of such technique, we have made some experimental exposures using the lowest kV obtainable on our apparatus, *i.e.*, 32, at 30 mA sec. We are, however, unable to produce anything more than an outline of a cat's body with no tissue penetration.

We should be very interested to learn the experience of others who may have used such low kV as 25-30 in small-animal radiography.

Yours faithfully,

CHURCHILL FROST,
E. HARROD.

Royal Veterinary College and Hospital,
Royal College Street,
London, N.W.1.

December 11th, 1955.